

WHAT IS CLAIMED IS:

1. A sensor, comprising:

5 a semiconductor substrate having a well of a membrane, wherein a sidewall of the well is insulated and a bottom of the well includes an insulation film;

a sensor material being placed inside the well and having a variable electrical characteristic according to a physics quantity to be sensed;

a heater being placed in the membrane and keeping a temperature of the sensor material constant; and

10 an electrode being contacted with the sensor material and measuring an electrical characteristic of the sensor material.

2. The sensor of claim 1, wherein the membrane is a double film of a silicon oxide and a silicon nitride.

15 3. The sensor of claim 1, wherein the physics quantity is a liquid component, a light, or a gas.

4. The sensor of claim 1, wherein the sensor material is a mixture of an  
20 insulator and a conductor.

5. The sensor of claim 1, further comprising an insulation film between the semiconductor substrate and the electrode.

6. The sensor of claim 5, wherein the membrane is a double film of a silicon oxide and a silicon nitride.

7. The sensor of claim 5, wherein the physics quantity is a liquid  
5 component, a light, or a gas.

8. The sensor of claim 5, wherein the sensor material is a mixture of an insulator and a conductor.

10 9. A method for manufacturing a sensor, comprising the steps of:  
forming an electrode on one side of a semiconductor substrate;  
forming an insulation film corresponding to a membrane on one side  
of the semiconductor substrate;  
forming a heater on one side of the semiconductor substrate;  
15 removing a part corresponding to a well from the other side of the  
semiconductor substrate to expose the electrode; and  
placing a sensor material inside the well.

10 20 10. The method for manufacturing a sensor of claim 9, further  
comprising a step of forming an insulation film before the step of forming the  
electrode.

11. The method for manufacturing a sensor of claim 9, further comprising a step of forming a protection film for protecting the heater after the step of forming the heater.

5           12. The method for manufacturing a sensor of claim 9, wherein the step of removing a part corresponding to a well comprises the steps of:

          forming a bulk etching mask in the other side of the semiconductor substrate;

          removing a part corresponding to a well from the other side of the  
10 semiconductor substrate to expose the electrode; and

          insulating a part corresponding to the sidewall of the well.

          13. The method for manufacturing a sensor of claim 9, wherein the step of forming the membrane includes a step of depositing a silicon nitride  
15 and a silicon oxide.